National Institute of Environmental Health Sciences

On the use of cool materials as a heat island mitigation strategy

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Abstract:

The mitigation of the heat island effect can be achieved by the use of cool materials that are characterized by high solar reflectance and infrared emittance values. Several types of cool materials have been tested and their optical and thermal properties reveal that these materials can be classified as "cool" with the ability to maintain lower surface temperatures. Cool materials can be used on buildings and other surfaces of the urban environment. Based on these results, a modeling study was undertaken to assess the urban heat island effect over Athens, Greece, a densely populated city, by trying to analyze the impacts of large-scale increases in surface albedo on ambient temperature. Numerical simulations were performed by the "urbanized" version of the nonhydrostatic fifth-generation Pennsylvania State University-NCAR Mesoscale Model (MM5, version 3-6-1). Two scenarios of modified albedo were studied: a moderate and an extreme increase in albedo scenario. It was found that large-scale increases in albedo could lower ambient air temperatures by 2°C. Furthermore, the impact of high albedo measures on heat island magnitude was estimated by creating a spatial representation of the urban heat island effect over the modeled area. The results of this study can help to promote the adoption of high albedo measures in building energy codes and urban planning regulations. © 2008 American Meteorological Society.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Meteorological Factors, Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Greece

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention: ☑

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified